COMMERCIAL STANDARDS CS231 A-E-C-3 ON AIRCRAFT HANGAR DOORS

Fact Sheet

In March 1958, the Hangar and Industrial Door Technical Council requested the cooperation of the Commodity Standards Division, National Bureau of Standards in establishing a series of commercial standards for hangar and industrial doors. These standards, listed below, are no longer valid and were withdrawn October 2, 1973.

CS231A-60, Aircraft Hangar Doors of the Manually-Operated Horizontal Sliding Type (Steel Frame),

CS231B-61, Aircraft Hangar Doors of the Individually Power-Operated Horizontal Sliding Type (Steel Frame),

C8231C-63, Aircraft Hangar Doors of the Partial-Group Power-Operated Horizontal Sliding Type (Steel Frame),

CS231D-63, Aircraft Hangar Doors of the Full Group Power-Operated Horizontal Sliding Type (Steel Frame), and

CS231E-63, Aircraft Hangar Doors of the Power-Operated Horizontal Unbraced-Canopy Type (Steel Frame).

The Hangar and Industrial Door Technical Council is no longer in existence.

The Federal Aviation Administration (FAA) may be able to provide assistance and information concerning current standards and requirements. Contact: Engineering and Specifications Division (622A), Office of Airport Safety and Standards, Federal Aviation Administration (FAA), 800 Independence Avenue, SW, Washington, DC 20591; Telephone: (202) 267-3826/-3053; Fax: (202) 267-3505/-3507.



National Bureau of Standards

COMMERCIAL STANDARDS AND SIM-PLIFIED PRACTICE RECOMMENDA-

Notice of Intent to Withdraw Certain Standards

In accordance with § 10.12 of the Department of Commerce procedures for the development of Voluntary Product Standards (15 CFR Part 10, as revised; 35 F.R. 8349 dated May 28, 1970), notice is hereby given of the Department's intent to withdraw the 81 standards identified below. It has been tentatively determined that each of these Commercial Standards (CS) and Simplified Practice Recommendations (SPR) are no longer technically adequate or used by the industry, or are otherwise not in the public interest.

CS 16-29	Wall Paper.
CS 26-30	Aromatic Red Cedar Closet
	Lining.
CS 27-36	Mirrors.
CS 28-46	Cotton Fabric Tents, Tarpau-
	lins and Covers.
CS 43-32	Grading of Sulphonated (Sul-
	phated) Oils Saponifiable Types.
CS 61-51	Venetian Blinds (Grade A
	Custom-Made).
CS 73-61	Old Growth Douglas Fir, Sitka
	· Spruce, and Western Hemlock
~~ ~~ ~~	Doors.
CS 76-39	Hardwood Interior Trim and Molding.
CS 78-40	Ground-and-Polished Lenses for
	Sun Glasses,
CS 79-40	Blown, Drawn, and Dropped
	Lenses for Sun Glasses.
CS 89-40	Hardwood Stair Treads and Risers.
CS 92-41	Cedar, Cypress and Redwood
	Tank Stock Lumber.
CS 119-45	Dial Indicators (For Linear Measurements).
CS 133-46	Woven Wire Netting.
CS 134-46	Cast Aluminum Cooking Utensils (Metal Composition).
CS 140-47	Testing and Rating Convectors.
CS 141-47	Sine Bars, Blocks, Plates and
	Fixtures.
CS 159-49	Sun Glass Lenses Made of
	Ground and Polished Plate

	oun Grasses,
XS 79-40	Blown, Drawn, and Dropped Lenses for Sun Glasses.
CS 89-40	Hardwood Stair Treads and Risers.
CS 92-41	Cedar, Cypress and Redwood Tank Stock Lumber.
CS 119-45	Dial Indicators (For Linear Measurements).
S 133-46	Woven Wire Netting.
CS 134-46	Cast Aluminum Cooking Utensils (Metal Composition).
CS 140-47	Testing and Rating Convectors.
CS 141-47	Sine Bars, Blocks, Plates and Fixtures.
CS 159-49	Sun Glass Lenses Made of Ground and Polished Plate Glass Thereafter Thermally Curved.
CS 160-49	Wood Fiber Blanket Insulation (For Building Construction).
OS 161-59	"Standard Grade" Hot Dipped Galvanized Ware (Coated After Fabrication).
CS 162-49	Tufted Bedspreads.
CS 167-50	Automotive and General Service
0.0 -0. 00	Copper Tube.
CS 168-50	Polystyrene Plastic Wall Tiles, and Adhesives for Their Ap- plication.
CS 169-50	Galvanized Ware Fabricated
	from Pregalvanized Steel
	Sheets (For Standard Grade
	Items Only).
CS 206-57	Solvent Weided (SWP Size) (Cellulose-Acetate Butyrate Pipe)

CS 225-59	Method of Rating Commercial
	and Industrial Type Vacuum
	Cleaners, Portable and Mobile
	Types.
CS 291A-60	Aircraft Hangar Doors Manually
. 00 1011	Operated Horizontal Sliding
	Type (Steel Frame).
CS 221R-61	Aircraft Hangar Doors, of the
00 2012 01	Individually Power-Operated
	Horizontal Sliding Type
	(Steel Frame).
CS 231C-63	Aircraft Hangar Doors of the
OB 25F0-00	Partial Group Power-Operated
	Horizontal Sliding Type
	(Steel Frame).
CG 291D_63	Aircraft Hangar Doors of the
CB 201D-00	Full-Group Power-Operated
	Horizontal Sliding Type (Steel
/	Frame
AG 2018-63	Frame). Aircraft Hangar Doors of the
VCB ZGIE-00	Power-Operated Unbraced-
	Canopy Type (Steel Frame)
CS 232-60	
CS 244 62	
CS 252-63	TFE-Fluorocarbon (Polytetra-
CG 202-00	fluoroethylene) Resin Electri-
	cal Insulating Tubing.
CS 263-64	
CS 267-65	
CD 201-00	Ducot mentioned oppositions.

SPR 6-63	Standard Stock Sizes of American Pattern and Curved				
	Milled Tooth Files and Rasps.				
SPR 11-36					
	Bed Blanket Sizes.				
SPR 22-40	Paper (Basic Sheet Sizes).				
SPR 31-63	Loaded Shot Shell.				
SPR 37-38	Commercial Forms (Invoice,				
	Purchase Order and Inquiry).				
SPR 42-61	Grocers' Paper Bags.				
SPR 47-54	Cut Tacks and Small Cut Nails.				
SPR 51-29	Chasers for Self-Opening and				
	Adjustable Die Heads.				
SPR 53-63	Steel Spirals for Reinforced				
	Concrete Columns.				
SPR 62-63	Metallic Cartridges.				
SPR 76-40	Ash Handles.				
SPR 81-28	Binders' Board.				
SPR 90-62	Hack-Saw Blades.				
SPR 91-32	Glass Containers for Preserves,				
D1 10 01 0-	Jellies and Apple Butter.				
SPR 129-59					
SPR 132-36	Ice Cream Cups and Cup Caps.				
SPR 146-52					
~ 1. 1. 1. 0-	Boxes for Canned Fruits and				
	Vegetables.				
CDD 150-94	Copper Wire Nails.				
SPR 100-04	Cans for Fruits and Vegetables				
Drg 100-40	Came for Links and Ackersores				

ties and Designated Use).

SPR 162-35 Packaging of Air Brake (Electric Rallway) Parts.

SPR 173-54 Stock Folding Boxes for Millinery. SPR 175-40 Heavy-Duty, Round Paper, Food and Beverage Containers and Lids.

(Names, Dimensions, Capaci-

SPR 187-42 Food Trays or Dishes (Waxed Paper, Molded Wood Pulp, and Wood Types).

SPR 197-51 Glass Containers for Maraschino Cherries.

SPR 208-63 Standard Stock Sizes of Swiss Pattern Files.

SPR 208-55 Fluid-Milk Cans.

SPR 213-45 Asphalt Roll Roofing and Asphalt and Tar-Saturated Felt Products.

SPR 217-49 Copper Water Tube, and Copper and Brass Pipe.

SPR 218-46 Paper Tubes for Packaging Milk

Bottle Caps. SPR 223-47 Wire Nails and Staples.

SPR 228-47 Pallets for Handling Groceries and Packaged Merchandise.

SPR 235-48 Copper and Copper-Alloy Round Seamless Tube.

SPR 241-50 Copper and Copper-Alloy Rod. SPR 246-51 Wooden Kegs for Nails.

SPR 248-52 Packaging of Standard Malle-able Iron Screwed Pipe Fit-

able Iron Screwed Pipe Fit-tings, Black or Galvanized. SPR 250-53 Standard Drug Catalogs. SPR 251-54 Packaging of Gas Stop Cocks. SPR 252-60 Standard Sizes of Pint, Quart, and Half-Gallon Rectangular Ice Cream Cartons and Molds.

SPR 254-54 Packaging of Steel Pipe Couplings.

SPR 256-55 Steel Outlet Boxes, Zinc or Cadmium Coated.

SPR 257-55 Thermal Conductance Factors for Preformed Above-Deck Roof Insulation.

SPR 258-56 One-Pound Eastern Flat Margarine Carton.

SPR 261-58 One-Pound Elgin-Style Butter Cartons Sizes.
SPR 262-60 Acoustical Materials.

SPR 263-60 Standard Shapes, Sizes, Grades and Designations of Cemented Carbide Products.

Any comments or objections concerning the intended withdrawal of any of these standards should be made in writing and directed to the Office of Engineering Standards Services, National Bureau of Standards, Washington, D.C. 20234, within 45 days of the publication of this notice. The effective date of withdrawal, where appropriate, will be not less than 60 days after the final notice of withdrawal. Withdrawal action terminates the authority to refer to a published standard as a voluntary standard developed under the Department of Commerce procedures, from the effective date of the withdrawal.

Dated: February 28, 1972.

LEWIS M. BRANSCOMB, Director.

[FR Doc.72-3253 Filed 3-2-72;8:49 am]

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. National Bureau of Standards

VOLUNTARY PRODUCT STANDARDS Notice of Withdrawal

In accordance with § 10.12 of the Department's "Procedures for the Development of Voluntary Product Standards" (15 CFR Part 10, as revised; 35 F.R. 8349 dated May 28, 1970), notice is hereby given of the withdrawal of the seven standards identified below:

CS 231A-60, "Aircraft Hangar Doors Manually-Operated Horizontal Sliding Type (Steel Frame)"

CS 231B-61, "Aircraft Hangar Doors of the Individually Power-Operated Horizontal Sliding Type (Steel Frame)"

CS 231C-63, "Aircraft Hangar Doors of the

CS 231C-63, "Aircraft Hangar Doors of the Partial Group Power-Operated Horizontal Silding Type (Steel Frame)"
CS 231D-63, "Aircraft Hangar Doors of the Full Group Power-Operated Horizontal Silding Type (Steel Frame)"
CS 231E-63, "Aircraft Hangar Doors of the Power-Operated Hangar Doors of the Po

Power-Operated Unbraced-Canopy Type (Steel Frame)"

SPR 258-56, "One-Pound Eastern Flat Mar-

garine Carton"
SPR 261-58, "One-Pound Elgin-Style Butter
Carton Sizes"

This action is taken in furtherance of the Department's announced intention, as set forth in the public notice appearing in the Federal Register of March 3, 1972 (37 FR 4459), to withdraw these seven standards:

The effective date for the withdrawal of these standards will be October 2, 1973. This withdrawal action terminates the authority to refer to these standards as voluntary standards developed under the Department of Commerce Procedures.

Date: July 30, 1973.

RICHARD W. ROBERTS. Director.

[FR Doc.73-16036 Filed 8-2-73;8:45 am]

DO NOT REMOVE

A. I. HERLERSON

COMMERCIAL STANDARD CS231E-63

Aircraft Hangar Doors of the Power-Operated Unbraced-Canopy Type (Steel Frame)

A recorded voluntary standard of the trade published by the U.S. Department of Commerce



U.S. DEPARTMENT OF COMMERCE OFFICE OF TECHNICAL SERVICES

Commodity Standards Division

With the cooperation of the National Bureau of Standards and the Federal Aviation Agency

EFFECTIVE DATE

Having been passed through the regular procedures of the Commodity Standards Division, and approved by the acceptors hereinafter listed, this Commercial Standard is issued by the U.S. Department of Commerce, effective April 15, 1963.

LUTHER H. HODGES, Secretary.

COMMERCIAL STANDARDS

Commercial Standards are developed by manufacturers, distributors, and users in cooperation with the Commodity Standards Division of the Office of Technical Services and with the National Bureau of Standards. Their purpose is to establish quality criteria, standard methods of test, rating, certification, and labeling of manufactured commodities, and to prove uniform bases for fair competition.

The adoption and use of a Commercial Standard is voluntary. How-

ever, when reference to a Commercial Standard is voluntary. However, when reference to a Commercial Standard is made in contracts, labels, involved or advertising literature, the provisions of the standard are enforcing through usual legal channels as a part of the sales contract.

Exercial Standards originate with the proponent industry. The sponsors may be manufacturers, distributors, or users of the specific product. One of these three elements of industry submits to the Commodity Standards Division the necessary data to be used as the basis for developing a standard of practice. The division by means of assembled conferences or letter referenda, or both, assists the sponsor group in arriving at a tentative standard of practice and thereafter refers it to the other elements of the same industry for approval or for constructive criticism that will be helpful in making any necessary adjustments. The regular procedure of the division assures continuous servicing of each Commercial Standard through review and revision whenever, in the opinion of the industry, changing conditions warrant such action.

SIMPLIFIED PRACTICE RECOMMENDATIONS

Under a similar procedure the Commodity Standards Division cooperates with industries in the establishment of Simplified Practice Recommendations. Their purpose is to eliminate avoidable waste through the establishment of standards of practice for sizes, dimensions, varieties, or other characteristics of specific products; to simplify packaging practices; and to establish simplified methods of performing specific tasks.

The initial printing of CS231E-63 was made possible through the cooperation of the Hangar and Industrial Door Technical Council.

Aircraft Hangar Doors of the Power-Operated Unbraced-Canopy Type (Steel Frame)

1. PURPOSE

1.1 The purpose of this Commercial Standard is to establish nationally recognized minimum requirements for design, material, fabrication, assembly and installation of Aircraft Hangar Doors of the Power-Operated, Unbraced-Canopy Type. It is intended to serve as a basis for the preparation of detailed individual job specifications by architect-engineers, and as an aid and guide to producers, contractors, and others interested in the product.

2. SCOPE

2.1 This standard covers the minimum requirements for structural and operational design, materials, methods of construction, and installation features. It defines this style of door and states what the

manufacturer provides as the completed door.

2.1.1 This standard covers primarily the fabrication of hangar doors; however, it should be understood that the doors cannot be expected to operate satisfactorily unless the door opening is properly prepared according to the manufacturer's recommendations. Therefore, certain requirements related to the work of other trades are given in the appendices and it will be necessary that these be adhered to in order to obtain the hangar door manufacturer's guarantee; see Section 4.2 and Appendices A and B. Customary methods of inspection after installation are described in Appendix C.

3. DEFINITION

3.1 A Power-Operated Unbraced-Canopy Type Aircraft Hangar Door is a single leaf overhead-acting type door, the top half of which is guided into a horizontal position inside the hangar with the lower half of the door forming a canopy outside the hangar. The door is activated by means of an electrically operated and controlled power unit,

NOTE: To minimize the moving force and to provide safety, it is recommended that the weight of the door be balanced by means of a counterweight, and the vertical action accomplished by several lift cables reeved overhead to the operator and counterweights.

4. GENERAL REQUIREMENTS

4.1 Approval Drawings.—The door manufacturer shall submit for approval, to the proper authority as specified in the individual job specifications, three sets of drawings showing general arrangement of the door, hardware, operators, wiring diagrams, and schematic drawing of electrical controls, as they are related to the completed structure. Structural steel details affecting any door requirements shall be submitted to the door manufacturer for review, coor-

dination, and approval.

4.2 Responsibilities.—The door manufacturer shall furnish all labor, materials, tools, equipment, and services required for the fabrication and installation of the Power Operated, Unbraced-Canopy Hangar Door. The door manufacturer shall not provide nor be responsible for the main overhead structural framing required to support the door and operator; the jamb guides; sill nosing; head soffit; the counterweight towers, guides, and enclosure; the electric wire, conduit and accessories, and wiring labor required for the door operation; the preparation of building jambs and head for the attachment of weather stripping material; glazing; field paint; master-keyed cylinders; and concrete for counterweight material (see Appendix A).

4.3 Shop Paint.—All steel, all inaccessible surfaces, all miscellaneous parts, and hardware shall be shop primed. This paint shall be a high quality commercial grade steel primer as required in the individual job specifications. All steel shall be cleaned prior to paint-

ing to remove all oil, rust and other foreign material.

NOTE: The shop coat of paint is a priming coat intended to protect the steel for a temporary period of weathering only and to provide a base for further painting. The door manufacturer does not assume responsibility for deterioration that may result from extended exposure to the elements.

4.4 Weather Stripping Material.—Material which is adjustable and readily replaceable shall be provided at the head. Fixed closure plates shall be provided at the jambs. Material for head and jamb shall be provided to afford a substantially weather tight installation.

4.4.1 Non-Metallic Weather Stripping Material.—Material on the soffit plate at the head of the opening shall be wipe-type two-ply cloth-inserted 100% neoprene as required in the individual job specifications. The material shall have a minimum thickness of ½ inch and shall be retained continuously for its full length and secured with rust-resistant fasteners on 9 inch centers.

4.4.2 Metallic Weather Stripping Material.—A steel closure plate shall be provided to weather the opening along the jamb guide

members.

4.5 Insulation.—When required, insulation shall be furnished by the door manufacturer, except where the insulation is part of a sandwich panel which is furnished by others. The insulation shall meet requirements for the geographic location and design as established in the individual job specifications. It shall be installed in accordance with the insulation manufacturer's recommendations, and the insulation shall be protected by liner sheets to a minimum height of 6 feet above the floor.

4.6 Workmanship.—All components furnished by the manufacturer (see par. 4.2) shall be free from defects that affect the serviceability or the appearance of the completed unit.

4.7 Maintenance Information.—Recommendations or instructions for proper maintenance of the door shall be furnished by the door

manufacturer for the guidance of the purchaser.

5. DETAIL REQUIREMENTS

5.1 Design Criteria.—Doors shall be designed and constructed of standard structural sections or formed plates of ample size and strength for loads and stresses imposed under specified conditions in accordance with the latest applicable American Institute of Steel Construction Specifications. Doors shall be designed to withstand, in fully closed position with floor locks engaged, the minimum external or internal wind loads specified in ASA A58.1-1955; 2 but at no time shall this minimum be less than 20 pounds per square foot, with a wind load deflection not to exceed the length of any framing member in inches divided by 120. For any position other than fully closed and locked, the door shall be designed for 5 pounds per square foot wind load with deflections no greater than the above.

5.2 Materials.—All framing members shall be either standard structural sections or formed plates. Structural sections and formed plates shall comply with the latest American Iron and Steel Institute Specifications.3 Flat external door covering shall be a commercial quality prime steel sheet, not less than No. 13 gage. Other types of covering material are acceptable when dictated by architectural treatment; however, due consideration must be given to framing design and clearances. When aluminum covering is used, the contact face of the frame shall have a protective coating to eliminate any possibility of electrolysis. All materials shall be of grades which equal or exceed requirements established by the American Society for Testing and

Materials.5

5.3 Door Leaf Construction

5.3.1 General.—Door sections in sizes suitable for convenient shipping shall be of welded construction and all joints shall develop 100% of the strength of the framing members. An alternate and equally acceptable construction is one in which members are prefabricated for field assembly. Under this alternate method of construction framing members can be either welded or bolted. If bolting is used, rib or high strength bolts must be used for fastening main members. Common bolts are satisfactory for secondary members.

5.3.2 Fabrication.—Vertical members shall be continuous throughout the height of the door. Vertical members adjacent to each other and being joined together in the field shall be accurately prepared to facilitate field assembly in accordance with standard practice. All frames and framing members shall be true to dimension and square in all directions and the leaf shall not be bowed, warped, or out of line, in the vertical or horizontal plane of the door opening, by more than

¹ Available from American Institute of Steel Construction, 101 Park Avenue, New York 17, N.Y.

² Available from American Standards Association, 10 E. 40th Street, New York 16, N.Y.

³ Available from American Iron & Steel Institute, 150 E. 42d Street, New York 17, N.Y.

⁴ U.S. Gage, thickness 0.0897 inches within commercial tolerances.

⁵ Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia 8, Pa

1/8 inch in 20 feet. To stiffen the back flange of all main vertical members, full depth members or adequate horizontal gusset plates at the one-third points shall be considered minimum lateral support. Diagonal bracing shall be provided so that the completed leaf assembly will be adequately braced to withstand shipping, assembly and operational loads. Exposed welds and welds which interfere with the installation of various parts, such as cover sheets and sash, shall be ground smooth. Where flat cover sheets are used they shall be sealed with a mastic or caulking compound of a quality as required in the individual job specifications and fastened to the frame either by welding, spot welding, threaded fasteners or drive fasteners on 9 inch centers. Where flat sheets are attached as either covering or liner sheets the clear unsupported area shall not exceed 25 square feet. All outside edges of cover sheets shall be made weather tight before shop painting.

5.4 Sash Inserts.—When required, all sash shall be of standard commercial fixed type construction suitable for outside putty glazing in accordance with standard practice. All outside edges of sash shall be made weather tight before shop painting. Sash shall be either welded or through bolted to door leaf frame on 9 inch centers.

5.5 Personnel Doors.—When required, doors shall be not less than 3 feet in width by 7 feet in height. The doors shall be 134 inch thick standard industrial steel doors, complete with sill, of the out-swing type with provision for glazing the upper portion. The doors shall have suitably sized closers, standard hinges, and a lockset designed to lock the door securely by key from the outside, and be operable from the inside by a thumb turn, lever, or other suitable device not requiring a kev.

5.6 Hardware.—Hardware shall be of a suitable design for use on hangar doors. The door manufacturer shall provide floor locks, jamb rollers and overhead guide rollers, pick-up cables, and sheaves as

part of the finished door.

5.6.1 Floor Locks.—Floor locks shall be provided at the sill of the door directly adjacent to main vertical members. Maximum spacing shall be not more than 20 feet. Floor locks shall be positive acting, and shall be so constructed to transmit the wind load on the face of the

door in its closed position into the sill or hangar apron.

5.6.2 Jamb Rollers and Overhead Guide Rollers.—Jamb rollers and overhead guide rollers may be steel or gray iron castings, machined to true diameters and supplied with roller, ball or sleeve bearings. Anti-friction bearings shall be equipped with fittings for lubrication. Gray iron castings shall meet the requirements for Class 35B as specified in the latest edition of ASTM Designation A48, Speci-

fications for Gray Iron Castings.

5.6.3 Pick-up Cables.—Pick-up cables shall be improved plow steel wire ropes with hemp centers. Each rope shall have an easily accessible threaded adjustment. Where counterweights are used on both sides of the opening—with the operator centered at the head of the opening—an even number of cables shall be used. Cables shall be of sufficient size to sustain the dead weight of the door, plus a 25% impact allowance, and plus the vertical component of the wind load with the door open at an angle of 45 degrees; all with a minimum safety factor of 5.

Sheaves.—Sheaves may be either cast-iron or steel of a design adequate for the material being used, with cable grooves concentric with the machined bearing seats. All sheaves shall be mounted on ball or roller bearings of adequate size for load and operational requirements. Bearings shall be sealed and prelubricated for life of bearing, or provided with fittings for supplemental lubrication. Fleet angles of cables onto sheaves shall be held to a maximum of 2 degrees.

5.7 Counterweights.—Counterweights shall be concrete when not furnished by the door manufacturer. The door manufacturer may, however, at his option, furnish steel slugs as a substitute. Suitable means for supporting the counterweight and sufficient instructions for the preparation and installation of this weight shall be provided. When space limitations preclude the use of the above material, steel plate or cast-iron weights of uniform size and shape, furnished by the door manufacturer, shall be used. Sufficient trimmer weights shall be provided for close adjustment of the counterbalance. Necessary counterweight guide shoes and cable connections shall be provided for

each counterweight box, frame or rack.

5.8 Overhead Guides.—Overhead guides shall be of the individual manufacturer's design. They shall provide an operation pattern that causes the top of the door leaf to travel back into the building and the bottom of the door leaf to move to the outside of the building forming a canopy over the opening when in fully open position. The overhead guides shall be provided with sufficient adjustment to assure proper alignment for satisfactory door operation and shall be of a design that will transmit the wind loads applied to the face of the door into the structural portion of the building. The maximum spacing between the overhead guides must be determined by the design wind loads for the door but in no case shall they be spaced more than 25 feet center to center.

DOOR OPERATION

6.1 Operating Unit.—Operation of the Unbraced-Canopy Door shall be by a drum designed to pull the cables equally and to cause the door to operate at a maximum speed of 45 feet per minute. The operator shall consist of either a separate motor and self-locking gear reducer or a self-locking gearhead motor, high speed shaft brake, necessary roller chain, sprockets, gears, and drums. The operating system shall be provided with a means for emergency mechanical operation. An electrical interlock shall be provided to prevent the starting of the motor while the mechanical operator is engaged. The motor shall be a single speed, squirrel cage type unit of sufficient size to operate the door leaf under zero wind load conditions at not more than 75% of the rated capacity. When the door area exceeds 1,600 square feet the door operator shall be provided with a mechanical cushioning device or dual speed constant torque motor.

6.2 Electrical Equipment and Control.—The door manufacturer shall furnish each leaf with its proper electrical equipment and controls, built in accordance with the latest NEMA 6 Standards. All equipment and control circuits shall be installed in accordance with the National Electrical Code Standard No. 70,7 and requirements of

Available from National Electrical Manufacturers Association, 155 E. 44th St., New York 17, N.Y.

7 Available from National Fire Protection Assn., 60 Batterymarch St., Boston 10, Mass.

other authority having jurisdiction and where located 18 inches or

less above the floor, shall be explosion-proof.

6.2.1 Starters.—The magnetic reversing starter shall be factory wired with overload and undervoltage protection, equipped with mechanical and electrical interlocks and with transformers, when required, for the control circuit, all enclosed in a hasp-equipped general purpose NEMA I ⁶ enclosure, with a wiring diagram placed on the inside of the cover.

6.2.2 Push Buttons.—The door shall be controlled by constant pressure mushroom head push buttons mounted at one jamb, one button marked "OPEN" and one marked "CLOSE". Removing pressure from either button shall stop door movement. All interior push buttons shall be in general purpose NEMA I enclosures. An acceptable alternate to the push button station is a drum controller equipped with a spring return.

6.2.3 Limit Switches.—Limit switches shall be provided to stop the travel of the door at its fully opened or fully closed position.

6.3 Warning Devices.—An audible signal shall be provided and shall operate when the push button is actuated for movement of the door in either direction.

7. INSTALLATION

7.1 Door and Accessories.—The leaf and accessories shall be installed in a thoroughly workmanlike manner. All openings and other accessories shall be completely prepared, in advance of the actual door installation, by the proper contractor in accordance with the approved shop and installation drawings (see par. 4.1). Doors shall be installed in strict accordance with the directions of the hangar door manufacturer. No door shall be installed until the hangar roof has been completed and all other dead loads applied.

8. CERTIFICATION

8.1 In order to assure the purchaser that the design, quality, and workmanship are as specified herein, producers may individually, or in concert with their trade association, issue guarantees or mark each door, leaf, or part thereof by a stamp, or label as conforming to this standard. The following wording is recommended:

This Power Operated, Unbraced-Canopy Type Aircraft Hangar Door complies with all of the requirements of Commercial Standard CS231E-63, as developed by the trade under the Commodity Standards Procedures and issued by the U.S. Department of Commerce.

(Name of Manufacturer)

APPENDIX A

The following numbered items describe work and responsibilities required to be performed by trades other than the door manufacturer and it is recommended that this information be closely followed.

1. Collateral Steel.—The collateral steel consisting of opening jambs and jamb roller guides, opening header and soffit plate, lateral support members for the top guide tracks and operator, longitudinal support members for pickup cable sheaves and operator, lateral and longitudinal support members for both counterweight towers and

sheaves, counterweight tower framing and enclosures, counterweight guides, and sill nosing members shall be furnished and erected in accordance with the door manufacturers' requirements, unless otherwise specified. These items form an integral part of the structural portion of the building and should be included with the general structural steel. However, the usual tolerances for structural steel cannot be followed. The maximum allowance for misalignment must be held to not more than ½ inch in 20 feet for out of plumb and ½ inch out of exact location as shown on the door manufacturers' drawing, in any direction (see Appendix B, Item 3).

2. Glazing.—All glass to be furnished and installed in accordance

with standard practice.

3. Field Paint.—All field paint and painting to be in accordance with specified requirements and shall also include painting of bolt heads and nuts, field welds, and touch-up of abrasions in the shop coat. Painters should exercise care and be specifically cautioned not to paint operating parts, mechanisms or limit switches. Field paint requirements should be modified to take into consideration atmospheric conditions and geographic location of installation.

4. Locks.—If master-keyed lock cylinders are desired in personnel doors they should be included in the building hardware specifications. Any pad-locks or special locks for electrical control panels should also

be included in the building hardware specifications.

5. Preparation for Weather Stripping Material.—Where weather stripping material attaches to building jambs, soffits, etc., the preparation and installation of mountings, holes in building members, and other provisions for attachment are to be in strict accordance with the door manufacturer's drawings.

6. Concrete Counterweights.—The necessary quantity of concrete including the material, preparation of forms (if necessary) and the pouring of concrete is to be done by others in accordance with instruc-

tions as set out by the door manufacturer.

7. Electrical Wiring and Source of Power.—All conduit, wire, junction boxes, accessories, and wiring to and between all electrical equipment on or for the doors are to be installed in accordance with door manufacturer's diagram. Where electric power is not avaliable at the site of the installation, the buyer or his agent shall make provision to have a temporary source of electric power supplied as is deemed necessary by the door manufacturer for the proper installation of doors.

APPENDIX B

The following numbered items are design features which are recommended and intended to guide the architect-engineer in the initial

building layout work.

1. Clearances.—Movement of the door will require an interior head clearance of approximately 30 inches vertically and one-half of door height plus 24 inches horizontally back of door header. Clearances must also be provided for operator equipment, cables and cable sheaves. Space for and location of the counterweight towers must be established to suit door requirements and building design.

2. Loads.—After the preliminary design of the building and door has been established, the magnitude, location and direction of all door

loads which will affect the final structural design must then be taken

into consideration.

3. Collateral Steel.—In order that a sufficient quantity of auxiliary steel will be identified and included as part of the structural steel and the responsibility for it clearly established, the items of collateral steel, necessary for Unbraced-Canopy Doors are as follows: opening jambs and jamb roller guides, opening header and soffit closure plates, lateral support members for the top guide tracks and operator, longitudinal support members for pick-up cable sheaves and operator, lateral and longitudinal support members for both counterweight towers and sheaves, counterweight tower framing and enclosures, counterweight guides, and the sill nosing member required for floor installation. It should be pointed out that a large portion of this collateral steel serves not only as a door equipment support but, also, acts as a wind brace or strut between the first and second trusses of the building.

Due to some slight variations in the designs of individual door manufacturers, a final detailed requirement for collateral steel cannot be established until after the door manufacturer has been selected. For preliminary use a suggested requirement can be made when door clearances and loads are determined. Upon selection of the door manufacturer the procedure as set out in Paragraph 4.1 of this standard will be followed and the drawing will show detail requirements for and in the collateral steel for the attachment of the door equipment. This latter information will then be submitted to the structural steel fabricator for detailing and fabrication (See Appendix A,

Item 1).

4. Sill Nosing.—It is recommended that a ¾ inch sill nosing be provided in the floor across each opening. This nosing should be clear of the inside flange of the sill member on the door and act as a sill

weathering joint.

5. Explosion-Proof Equipment.—It will be necessary to establish and clearly indicate if the area about the door including the electrical operator and control circuiting might be classified as a hazardous area and therefore require explosion-proof electrical equipment.

APPENDIX C

The following procedures are recommended for inspection and test-

ing of the installed door.

Inspection of the hangar door installation should be made by the purchaser or his agent immediately after installation, at which time the door manufacturer or his representative will perform a complete operating test. Any defects disclosed by the test are to be corrected by the door manufacturer and the installation delivered in an acceptable operable condition. After such inspections and tests, and with the doors in proper operating condition, a separate written acceptance of the installation is usually given the door manufacturer by the purchaser and/or owner or his representative.

HISTORY OF PROJECT

In March 1958, the Hangar and Industrial Door Technical Council requested the cooperation of the Commodity Standards Division in

establishing a series of Commercial Standards for hangar and industrial doors. This standard is the fifth in the series.

The following is a list of Commercial Standards for other types of hangar and industrial doors which have been proposed by the Hangar and Industrial Door Technical Council:

CS231A-60, Aircraft Hangar Doors of the Manually-Operated Horizontal Sliding Type.

CS231B-61, Aircraft Hangar Doors of the Individually Power-Operated Horizontal Sliding Type.

CS231C-63, Aircraft Hangar Doors of the Partial Group, Power-Operated Horizontal Sliding Type.

CS231D-63, Aircraft Hangar Doors of the Full-Group, Power-Operated Horizontal Sliding Type.

Proposed Commercial Standard for Industrial Doors of the Mechanically and Power-Operated Vertical Lift Type.

Proposed Commercial Standard for Industrial Doors of the Two-Leaf Turnover Type.

Information on these standards may be obtained by writing the Commodity Standards Division, U.S. Department of Commerce, Washington 25, D.C.

The Council, through its Technical Committee, prepared a draft, which was circulated to representative groups of manufacturers, architects, airports, and municipalities for preliminary comment and approval. From suggestions offered, the draft was modified to coincide with the concensus of opinion expressed and was reviewed by the Federal Aviation Agency and the National Bureau of Standards. Copies were then circulated to the industry for written acceptance, and through trade endorsement was adopted and established as a voluntary standard of practice becoming effective April 15, 1963.

Project Manager: Edward J. McCamley, Commodity Standards Division, Office of Technical Services, U.S. Department of Commerce.

Technical Advisers: Stanley Dube, Airport Engineering Branch, Airports Services, Federal Aviation Agency; Stephen A. Cannistra, Installation & Materiel Service, Federal Aviation Agency.

STANDING COMMITTEE

The following individuals comprise the membership of the standing Committee, which is to review, prior to circulation for acceptance, revisions proposed to keep the standard abreast of progress. Comment concerning the standard and suggestions for revision may be addressed to any member of the committee or to the Commodity Standards Division, Office of Technical Services, U.S. Department of Commerce, which acts as secretary for the committee.

A.E. Wetter, Byrne Doors, Inc., 1603 E. Nine Mile Rd., Ferndale 20, Michigan (Chairman)

C. J. Erny, The Peelle Co., 47 Stewart Ave., Brooklyn 37, N.Y.

Arthur Kohn, Fleming Steel Co., New Castle, Pa.

W. R. Yokel, International Steel Co., Hangar & Industrial Door Div., 1321 Edgar St., Evansville 7, Indiana

Edward E. Ingraham, Manager, LaGuardia Airport, Box 577, Flushing 71, N.Y., Representative from the American Association of Airport Executives V. Neisch, American Airlines, 100 Park Avenue, New York, N.Y.

D. P. Denitto, Roberts and Schaefer Co., 254 W. 54th St., New York, N.Y. Robert E. Linton, Albert Kahn Associated Architects and Engineers, Inc., New Center Bldg., Detroit 2, Mich.

ACCEPTORS

The manufacturers, distributors, users and others listed below have individually indicated in writing their acceptance of this Commercial

Standard prior to its publication. The acceptances indicate an intention to utilize the standard as far a practicable, but reserve the right to depart from it as may be deemed desirable. The list is published to show the extent of recorded public support for the standard and should not be construed as indicating that all products made by the acceptors actually comply with its requirements.

Products that meet all requirements of the standard may be identified as such by a certificate, grade mark, or label. Purchasers are encouraged to require such specific representations of compliance, which may be given by the manufacturer whether or not he is an acceptor.

ASSOCIATIONS

(General Support)

American Institute of Architects, Washington, D.C.

FIRMS AND OTHER INTERESTS

Baumer, Herbert (Architect), Columbus, Ohio Byrne Doors, Inc., Detroit, Mich.

Camlet, J. Thomas (Architect and Engineer), Garfield, N.J.
Central Airlines, Inc., Fort Worth, Tex.
Cincinnati, City of (Engineering Div.), Cincinnati, Ohio
Conrad & Cummings (Associated Architects), Binghamton, N.Y.

Dresser Ideco Co., Columbus, Ohio

Erwin-Newman Co., Houston, Tex. Fleming Steel Co., New Castle, Pa.

Hardy Doors, Inc., Detroit, Mich. Hartley Boiler Works, Inc., Montgomery,

International Steel Co., Evansville, Ind.

Massachusetts Port Authority, Boston, Mass.
McPherson Co. (Engineers-Architects),
Greenville, S.C. (General Support)
Mesker Steel Corp., Geo. L., Evansville, Ind.
Miller, Miller & Associates (Architects),
Terre Haute, Ind.

Northeast Airlines, Inc., E. Boston, Mass.

Pendleton Municipal Airport, Pendleton, Oreg. Piedmont Airlines, Winston-Salem, N.C.

St. Joseph County Airport, South Bend, Ind. Southern Air Transport, Inc., Miami, Fla. Stoetzel, Inc., Ralph (Architects), Chicago, Ill.

Trans World Airlines, Inc., Kansas City, Mo. Virginia, University of, Charlottesville, Va.

U.S. GOVERNMENT

Army, Dept. of the, Of. of Chief Engineers, Washington, D.C. Health, Education, and Welfare, Dept. of, Washington, D.C. GSA, Standardization Div., Federal Supply Service, Washington, D.C. (General Support)

(Cut on this line)

ACCEPTANCE OF COMMERCIAL STANDARD

CS231E-63 Aircraft Hangar Doors of the Power-Operated, Unbraced-Canopy Type (Steel Frame)

If acceptance has not previously been filed, this sheet properly filled in, signed,

and returned will prov of this Commercial State	ide for the recording ndard.	of your organiza	tion as an acceptor
		Date	
Commodity Standard Office of Technical S U. S. Department of Washington 25, D. C.	Services Commerce		
Gentlemen: We believe that the ard of practice, and we in the	is Commercial Star e individually plan t	ndard constitute o utilize it as fa	es a useful stand- ir as practicable
production ¹	$distribution^1$	purchase ¹	testing 1
of this commodity.			
We reserve the rig We understand, of ply with the standar forming thereto.	ght to depart from the course, that only th d in all respects can	ose articles wh	ich actually com-
Signature of authoriz	ed officer		4:
- (Vi	adly typewrite or print th	(In ink)	
(811	idly typewille of pillit th	e tottowing times)	
Name and title of ab	ove officer		
Organization Street address	(Fill in exactly	as it should be lis	ted)
City, zone, and State			

Underscore the applicable words. Please see that separate acceptances are filed for all subsidiary companies and affiliates which should be listed separately as acceptors. In the case of related interest, trade associations, trade papers, etc., desiring to record their general support, the words "General support" should be added after the signature.

TO THE ACCEPTOR

The following statements answer the usual questions arising in connection with the acceptance and its significance:

- 1. Enforcement.—Commercial Standards are commodity specifications voluntarily established by mutual consent of those concerned. They present a common basis of understanding between the producer, distributor, and consumer and should not be confused with any plan of governmental regulation or control. The United States Department of Commerce has no regulatory power in the enforcement of their provisions, but since they represent the will of the interested groups as a whole, their provisions through usage soon become established as trade customs, and are made effective through incorporation into sales contracts by means of labels, invoices, and the like.
- 2. The acceptor's responsibility.—The purpose of Commercial Standards is to establish, for specific commodities, nationally recognized grades or consumer criteria, and the benefits therefrom will be measurable in direct proportion to their general recognition and actual use. Instances will occur when it may be necessary to deviate from the standard and the signing of an acceptance does not preclude such departures; however, such signature indicates an intention to follow the standard, where practicable, in the production, distribution, or consumption of the article in question.
- 3. The Department's responsibility.—The major function, performed by the Department of Commerce in the voluntary establishment of Commercial Standards on a nationwide basis is fourfold: First, to act as an unbiased coordinator to bring all interested parties together for the mutually satisfactory adjustment of trade standards; second, to supply such assistance and advice as past experience with similar programs may suggest; third, to canvass and record the extent of acceptance and adherence to the standard on the part of producers, distributors, and users; and fourth, after acceptance, to publish and promulgate the standard for the information and guidance of buyers and sellers of the commodity.
- 4. Announcement and promulgation.—When the standard has been endorsed by a satisfactory majority of production or consumption in the absence of active, valid opposition, the success of the project is announced. If, however, in the opinion of the standing committee or of the Department of Commerce, the support of any standard is inadequate, the right is reserved to withhold promulgation and publication.